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Financialisation and physical investment: a global race to the bottom in accumulation?

Abstract: We estimate the effects of financialisation on physical investment in the developed and developing countries using panel data based on balance-sheets of publicly listed non-financial companies (NFCs) for the period 1995-2015. Among the developed economies, we focus on the cases of the USA, Japan, and a group of Western European countries. In the developing world, we present estimations based on the group of the NFCs in all developing countries as well as BRICS as a group- and country specific estimations for South Africa, South Korea, India, and China. We find robust evidence of an adverse effect of both financial payments (interests and dividends) and financial incomes on investment in fixed assets. The negative impacts of financial incomes are non-linear with respect to the companies' size; financial income crowds out investment in large companies, and have a positive effect on the investment of only smaller, relatively more credit-constrained companies. Our findings support the 'financialisation thesis' that the increasing orientation of the non-financial sector towards financial activities is ultimately leading to lower physical investment, hence to stagnant or fragile growth, as well as long term concerns for productivity in both developed and developing countries.

Keywords: financialisation, investment, non-financial sector, firm data, developing countries

JEL classifications: C23, D22, O16.

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1. Introduction

The last three decades have witnessed the development of a phenomenon now central in the evolution of capitalist economies: the ‘financialisation’ of the economy. Financialisation is summarized as an ongoing and self-reinforcing economic and social process that manifests itself in the growing prominence and influence of behaviours derived from the financial sector (Epstein, 2005). Following van der Zwan (2014), we can highlight three main features of this process: a) a new regime of accumulation largely shaped around financial motives, b) the consolidation of the ‘shareholder value’ as the key principle in corporate governance, and c) the dissemination of practices linked to finance within everyday life (pension schemes, mortgages provision, healthcare etc.). This article aims at contributing to the understanding of the impact of the first two aspects of financialisation on investment.

The mainstream literature asserts that financial markets facilitate the financing and the efficient allocation of investment (Beck et al., 2000; Beck and Levine, 2004; Gilchrist and Himmelberg, 1995; King and Levine, 1993; Levine, 2005; Love, 2003). However, Arestis and Demetriades (1997) warn against the robustness of these results. Moreover, the effect of stock market development on growth is found to be weaker than that of the banking sector (Arestis et al., 2001). Recently after the 2007-2008 crash, the impact of the disproportionate growth of the financial system has been questioned in some mainstream contributions as well (Beck et al., 2014; Cecchetti and Kharroubi, 2015; Cournède et al., 2015; Law and Singh, 2014). In particular, Law and Singh (2014) argue that there is a ‘threshold effect’ in the relationship between the extension of financial resources and growth; thus the expansion of the financial system is beneficial to growth only up to a point. Recently, a similar argument has been put forward by an IMF discussion note with respect to developing and emerging markets (Sahay et al., 2015), which argues that ‘too much finance’ increases both economic and financial volatility.

The Post-Keynesian literature on financialisation illustrates the negative impacts of expanding financial sector on income distribution and demand (Hein, 2013; Onaran et al., 2010), and in particular on investment (Cordonnier and Van de Velde, 2015; Dallery, 2009; Stockhammer, 2004, 2006). A similar argument can be found in the marxist literature, where the long-term trajectories of the economies gravitate more around the financial sector and less around the productive one (Foster, 2010). Since the 1980s, the slow down in investment and growth went along with a rise in the interest and dividend payments and share buybacks of the non-financial corporations (NFCs), which

‘punctured’ the value generated by the NFCs (Duménil and Levy, 2004). Therefore, companies experienced a significant reduction in available funds for physical investments.¹

In the recent years, there has been also an increasing interest in studying the different features of financialisation in the context of developing and emerging economies². In particular, Bracking (2012) provides an analysis of the relationship between financial liberalization and the changing patterns of exploitation of natural resources, whilst Aitken (2013) focuses on the perverse effect of financialisation on microcredit practices. Karwowski and Stockhammer (2016) provide an overview for several emerging countries based on the comparison of various macroeconomic aspects of financialization (e.g. financial deregulation, financial inflows, business and household debt). The authors find a considerable degree of variability in the intensity of financialization in the different countries.

Despite an expanding theoretical literature on the effects of financialisation, the empirical evidence is predominantly relegated to a macroeconomic perspective, especially in the case of physical investment. While the origins of the microeconomic approach to the impact of finance on investment can be traced back to Fazzari and Mott (1986) and Ndikumana (1999), to the best of our knowledge only Orhangazi (2008), Demir (2007; 2009), and Tori and Onaran (2015; 2017) analyse empirically the effects of financialisation on accumulation from a microeconomic perspective.

The novelty of this article is, to provide micro-econometric evidence on the effects of financialisation on investment using firm level data for both developed and emerging economies. We thus propose a comprehensive empirical assessment about the effects of financialization on corporate investments in various contexts, providing insights on both the relationship between investment decisions and external finance, and on the behavioural change regarding investment behaviours and ‘speculative’ activities. In addition, our results can be useful to develop the current microeconomic theory of the firm.

First, we focus on developed economies based on the cases of the USA, Japan, and a group of Western European countries (the 15 old Members states of the EU, Norway, and Switzerland). Next, we present the results for the developing world based on the group of all developing countries as well as the group of BRICS (Brazil, Russia, India, China, and South Africa), and country specific estimations for South Africa, South Korea, India, and China, for which there are data for a sufficiently large number of companies.

¹ In contrast, some authors of the Marxian tradition (e.g. Lapavistas, 2009; Kliman and Williams, 2014) argue for a reversed causality, that is financialisation of the economy should be understood as a consequence, and not as a cause of the slowdown in the capital accumulation.

² See Bonizzi (2013) and Tyson and McKinley (2014) for a survey.

The remainder of the article is organized as follows. Section 2 discusses the key theoretical and empirical contributions in the literature. Section 3 presents the alternative specifications of the investment model. Section 4 introduces the data and the stylized facts of our sample. Section 5 discusses the estimation methodology. Section 6 presents the estimation results. Section 7 concludes.

2. The relationship between liquidity constraints, financialisation, and the accumulation of fixed assets

In the earlier ‘accelerator investment models’ (e.g. Evans, 1967; Kuh and Meyer, 1955) investment is modelled as a function of expected profitability measured by sales. In contrast, the early neoclassical approach models the firm's investment decision as a static maximization problem of discounted flows of profits over an infinite time horizon (Jorgenson, 1963, 1971). As an alternative, investment models based on the maximization of the expected cash flows (or market value) in the presence of adjustment costs and expectations, which take the dynamic process explicitly into account, have been proposed (Chirinko, 1993). Within this group, the so-called ‘Q model’ of Brainard and Tobin (1968), which models investment using the Tobin's Q variable, defined as the ratio of the firm's stock market valuation to its capital replacement cost, has been widely used. However, firm-level empirical analysis has failed to provide evidence of a strong explanatory power of the Q variable (Bond et al., 1992; Hayashi and Inoue, 1991). Explanations of this finding focused on the bias of the stock market evaluation due to asymmetric information (Stiglitz and Weiss, 1981) and periodic ‘financial bubbles’ (Bond and Cummins, 2001; Bond et al., 2004). But more importantly, as argued by Hubbard (1998), the source of financing matter for investment.

Empirical evidence shows that cash-flows, that is internal funds, are important determinants of investment (Blundell et al., 1992; Brown et al., 2009; Fazzari et al., 1988). In particular, Fazzari et al. (1988) show that fluctuations in internal finance, as reflected by cash-flows, are statistically more important than the stock market evaluation in determining the level of accumulation. Liquidity constraints play a crucial role in determining investment (Chirinko and Schaller, 1995; Fazzari and Petersen, 1993; Kadapakkam et al., 1998). In addition, cash flow always has a significant positive effect on accumulation, whilst the effects of the stock market evaluation and debt are mixed (Bloom et al., 2007; Bond and Meghir, 1994; Bond et al., 2003; Devereux and Schiantarelli, 1990). The mainstream investment literature argues that companies' financing issues mainly derive from agency problems, and the development of financial markets can relax these constraints (Bond et al., 2003; Devereux and Schiantarelli, 1990; Guariglia and Carpenter, 2008; Love, 2003; Love and Zicchino, 2006; Pawlina and Renneboog, 2005). However, companies' financial flows are not directly taken into account in these analyses. As a result of the transformation of the economies towards a

financialized stage in the last decades, the mainstream models of investment may be misspecified due to their neglect of some important factors in the firms' financing and investment decision.

The Post-Keynesian literature offers a more holistic approach to the analysis of the effect of financial markets on investment, where NFCs are far from passive players under the control of oversized financial markets. In addition to (or even partially substituting) physical investments, NFCs can readily accumulate financial assets. The Post-Keynesian literature conceives the firm as a 'battlefield' for different vested interests (Stockhammer, 2006). The most visible type of internal conflict is reflected in shareholders' preference for short-term profitability, which undermines the accumulation of fixed capital (Dallery, 2009; Hein and van Treeck, 2008). There is a 'growth-profit trade-off' within the managerial decision-making process of firms (Lavoie, 2014). The increasing involvement of the NFCs in finance-related activities is analysed primarily as a consequence of a change in the corporate governance (Lazonick and O'sullivan, 2000). From the early 1980s onwards, there has been an increased orientation towards maximizing the 'shareholder value' (Rappaport, 1999). While the former imperative of the management has been to 'retain and re-invest', under the shareholder value orientation, to 'downsize plants and distribute earnings' is paramount. This strand of literature argues that this behavioral change has had a negative effect on long-term investment. Both distributing dividends and boosting share prices through share buyback operations has gained importance in this new era (De Ridder, 2009). Furthermore, firms find investing in reversible short-term financial assets as an attractive alternative to irreversible long-term fixed investment, and thereby the increased availability of financial assets may crowd out physical investment in core activities.

Regarding the firm level effect of finance on investment, Fazzari and Mott (1986) model investment as a function of three key variables: sales (as a proxy for capacity utilization), internal finance, that is 'less expensive' retained earnings, and interest payments, which form a 'committed constraint' on the available cash flow. In another microeconomic analysis, Ndikumana (1999) finds negative effects of both stock and flows of debt. Firm's indebtedness not only reduces the cash flow (via interest payments), but also affects the sustainability of investments. However, Fazzari and Mott (1986) and Ndikumana (1999) do not model the impact of financial revenues, which is an important dimension of firms' behaviour in this new era. To the best of our knowledge, there are only few microeconomic analysis that look at the effects of financial incomes of NFCs. Orhangazi (2008) finds a negative effect of financial payments and long-term debt on accumulation in the NFCs in the USA. The effects of financial incomes on investment depend on the firm size and sector, with a significant negative crowding out effect for larger firms, and a positive effect for the smaller firms in the non-durables sector, indicating its dual role as a source of internal finance. Demir (2007, 2009) focuses

on Argentina, Mexico, and Turkey. The author finds that financial liberalization in these three emerging countries channelled savings from the productive sector towards financial speculation, thus reducing the availability of funds for long-term physical investment (Demir, 2007). Moreover, increasing returns on financial assets relative to fixed assets significantly reduced accumulation in these emerging markets' NFCs (Demir, 2009).

Event though the available evidence depict financialisation as a phenomenon common to both advanced and developing economies, the different institutional and social settings at country or/and regional level reveal the presence of 'varieties of financialisation' (Lapavistas and Powell, 2013; Pike and Pollard, 2010).

Building on this literature, in the next section we describe different specifications of the model of investment, which take into account explicitly the effects of both financial income and payments on the NFCs' investment.

3. The specifications of the model

Investment is an intrinsically dynamic process (Bond and Meghir, 1994; Lopez and Mott, 1999), and there is a path dependency that links past and future levels of investment. Therefore, in line with the literature, we include the lagged investment as an explanatory variable in our specifications (Ford and Poret, 1991; Kopcke and Brauman, 2001; Orhangazi, 2008). Also all other explanatory variables are lagged in order to depict the 'adjustment processes'.

To capture the potential effects of two key financial channels, we enrich the model proposed by Fazzari and Mott (1986). Equation (1) presents our specification for the rate of accumulation of capital (investment/capital), I/K :

$$\begin{aligned} \left(\frac{I}{K}\right)_{it} = & \beta_0 + \beta_1 \left(\frac{I}{K}\right)_{it-1} + \beta_2 \left(\frac{S}{K}\right)_{it-1} + \beta_3 \left(\frac{\pi}{K}\right)_{it-1} + \beta_4 \left(\frac{F}{K}\right)_{it-1} \\ & + \beta_5 \left(\frac{\pi_F}{K}\right)_{it-1} + \beta_t + \varepsilon_{it} \end{aligned} \quad (1)$$

where I is the addition to fixed assets, K is the net capital stock, π is operating income, S is net sales, F is the sum of cash dividends and interest paid on debt, whilst π_F is the total non-operating (financial) income as the sum of interest and dividends received by the company. i is the firm index, B_t identifies a set of time-dummies to control for unobservable time-specific effects common to all firms in the different estimations, whilst the standard disturbance term ε_{it} captures firm-specific fixed effects and idiosyncratic shocks. All variables are introduced in first lag to reflect the time consideration in the investment plans. The operating income/fixed assets ratio is a measure of the

profit rate, the sales/fixed assets ratio is a proxy reflecting capacity utilization, financial payments/fixed assets and non-operating income/ fixed assets are the two measures of the impact of financialisation. We expect positive effects of the lagged accumulation rate, profit rate, and sales on investment. In contrast, in the light of the macroeconomic and microeconomic Post-Keynesian literature, we expect the impact of total financial payments (or ‘cash commitments’) to be negative. In this model cash dividends are conceived both as a reduction of available internal funds, and as reflecting behavioural changes due to the ‘shareholder value orientation’ (henceforth SVO) as suggested by Lazonick and O’Sullivan (2000).

Furthermore, not only do NFCs use part of their funds to pay interest and dividend to the financial sector, but they can also more than before pursue non-operating financial investment themselves, thus receiving financial income. We include the sum of interests and dividends received by the NFCs (π_F) as a ratio to K as an explanatory variable³.

The composite measure for outward financialisation, F , which is the sum of interest and dividend payments (as a ratio to K), capturing a) the liquidity effect of interest payments, and b) the additional behavioural effect of the SVO. In brief, F reflects the financial outflows, while π_F reflects the financial inflows. Theoretically, the sign of the effect of financial income on investment is ambiguous. On the one hand, these incomes may have a positive impact on accumulation of fixed assets by easing the liquidity constraint faced by firms. In particular, this can be the case for relatively smaller companies, which are more likely to experience liquidity restrictions compared to larger corporations. On the other hand, financial activities can also be detrimental to physical investment, since the NFCs will be attracted by short-term, reversible financial investment, instead of engaging in long-term, irreversible physical investment. In order to explore the potential different effect of financial payments in small vs. large companies in different economic areas, we estimate an extended version of specification (1) as,

$$\begin{aligned} \left(\frac{I}{K}\right)_{it} = & \beta_0 + \beta_1 \left(\frac{I}{K}\right)_{it-1} + \beta_2 \left(\frac{S}{K}\right)_{it-1} + \beta_3 \left(\frac{\pi}{K}\right)_{it-1} + \beta_4 \left(\frac{F}{K}\right)_{it-1} \\ & + \beta_5 \left(\frac{\pi_F}{K}\right)_{it-1} + \beta_6 \left[\left(\frac{\pi_F}{K}\right)_{t-1} * D_n\right]_{t-1} + \beta_t + \varepsilon_{it} \end{aligned} \quad (2)$$

³ Interest and dividends do not exhaust the spectrum of non-operating financial incomes of NFCs. In fact Krippner (2005) shows how capital gains account for a considerable part of NFCs financial profits. However, as recognised by Orhangazi (2008) with respect to Compustat database, also in Worldscope data on the NFCs’ capital gains are not available.

where the dummy variable D_n takes the value 1 if the average total assets of company i lies in the lower n percentile of the distribution, and takes the value 0 otherwise. The dummy is interacted with the financial incomes. We interacted financial incomes with different levels of total assets for each country/group. In this specification, while β_5 is the effect of financial incomes in large companies, $\beta_5 + \beta_6$ capture the effect of financial incomes in smaller companies.

With equations (1) and (2) we aim at introducing a full model of firm-level investment that is coherent with the Post-Keynesian tradition of investment analysis, and that a) takes into account the inherent irreversibility of physical investment, b) controls for the independent effect of profitability and demand, c) highlights the effects of financial relations, d) makes a clear distinction between operating and non-operating activities, and e) treats financial outflows and inflows (i.e. both outward and inward financialisation) as fundamental determinants.⁴

4. Data and stylized facts

We extracted our data from the Worldscope database of publicly listed firm's balance sheets, which contains standardized accounting information about not only investment, sales, profits, interest and dividend payments but also companies' financial incomes. Standardized data on financial payments and, in particular, financial incomes are difficult to find; our database allows us to have a comprehensive variable for our estimations. Worldscope database has been acknowledged as a valuable source in the literature on firm-level investment analysis (e.g. Cleary 1999; Love, 2003; Love and Zicchino, 2006; Pawlina and Renneboog, 2005). Table 1 summarize the countries included in our dataset.

[Table 1]

We extracted data for all active, publicly listed non-financial companies. Our data are annual for the period of 1995-2015. Due data availability, the individual country cases is limited to large economies with high numbers of publicly listed NFCs, as reliable estimations using dynamic panel data methodology requires a substantial number of cross sections, which makes country specific estimations unreliable for relatively smaller countries.

⁴ We also extended the model with total debt/fixed capital, and change in or the square of this ratio, but we did not find any statistically significant effects. Results are available upon request. An extended model with share buybacks was not feasible due to lack of data.

It is well known that the presence of outliers usually characterizes firm-level data. To prevent biased estimations, we apply a data screening process, by excluding extreme outliers from the sample.⁵ First, we select firms that have at least three consecutive observations for the dependent variable (I/K), which is also required for econometric purposes (Roodman, 2009). Second, we excluded companies with rate of accumulation (I/K) higher than 2.5, representing a growth rate of capital stock higher than 250 per cent. Third, we drop all the companies with a permanent negative mean net operating income for the whole period. Finally, we exclude observations in the upper and lower 1 per cent of each variable's distribution. With these adjustments, we finally have a total number of 161039 observations and 13289 companies. Next, we present the stylized facts of our sample for different country groups, and selected countries.

Figure 1a and Figure 1b show the trends of the ratio of investment (addition to fixed assets) to operating income. A common feature of the last twenty years has been a reduction in the reinvestment of profit of NFCs in all economic areas. Europe show the highest fall in this ratio (-32 per cent), followed by BRICS (-25 per cent). There have been substantial decreases also in the USA and Japan.

[Figure 1.a]

[Figure 1.b]

In the same period, the ratio of financial assets to fixed assets of the NFCs increased substantially (Figures from 2.1 to 2.12a). The magnitude of this increase has been particularly high for the developing countries as a whole. The BRICS have experienced an increase of 277 per cent in the ratio of financial assets to fixed assets. To summarize, NFCs across the world diverted funds from real investment towards the accumulation of non-operating financial assets.

[Figures 2.1a to 2.9a]

[Figures 2.1b to 2.9b]

Figures from 2.1 to 2.12b show the relationships between the rate of accumulation of physical capital and our two measures of financialisation - financial payments and incomes as a ratio to total assets- to detect the double-sided impact of financialisation. The increasing trends in the financial payments and incomes along with the stagnant rate of accumulation highlights the adverse effect of

⁵ Guariglia and Carpenter (2008), Love and Zichino (2006), Chirinko et al. (1999) and Orhangazi (2008) follow similar strategies to define and exclude the outliers. Our estimations are robust to the inclusion of the outliers.

the increasing orientation of NFCs towards non-operating activities. The rate of accumulations have been overall stagnant (in particular for the companies in Europe) or decreasing (BRICS). At the same time, NFCs' financial payments (dividends plus interests) have been increasing significantly, with the highest ratio to fixed assets reached in Europe. The European companies also had the highest level of non-operating incomes (as a ratio to fixed assets), but the 2007-8 crisis had led to a reversal in the NFCs' financial income. In all other areas, financial income increased considerably over the whole period including after the Great Recession, with BRICS' companies showing the most dramatic rise.

In The USA the financial assets as a ratio to fixed assets has reached 3.0 in 2015. The rate of accumulation remained stagnant and slightly fell. In contrast, in the last twenty years financial payouts almost doubled, reaching 30 per cent of fixed assets.

Japanese companies experienced a strong decline in the share of operating profit devoted to accumulation of fixed assets (I/π) from 1998 to 2000. However, after this period, reinvested profit remained relatively stable around 39 per cent. An increasing accumulation of financial assets, in line with the trends in other countries, resulted in increasing financial income, which, however, went along with a rise in the rate of accumulation after 2004 until the Great Recession. The unique low levels of financial payments in Japanese NFCs are due to the decreasing interest expenses, which mitigated the contemporaneous increase in cash dividends distributed to shareholders (See Figure A1 in the Appendix).

The rate of reinvestment in South Korean NFCs shows a dynamic similar to what we described for Japanese ones. It declined after the Asian crisis of 1997 and then stabilized around an average of 39 per cent. Financial assets as a ratio to total assets are lower than in other countries albeit an increase through time. The rate of accumulation has been decreasing along with a sharp increase in non-operating financial income, especially after 2003. As in Japan, South Korean companies benefited from a decrease in interest paid on debt (See Figure A2 in the Appendix) and this is reflected in the downward trend of total financial payments.

As shown for the majority of the countries, also South African NFCs decreased the portion of operating income devoted to physical investment (from 49 per cent to 37 per cent), and increased the accumulation of financial assets over fixed ones (from 0.32 to 1.25). South African NFCs substantially increased their dividends distributed and interest paid, with total payments recovering after a downturn in 2008. The increase in financial income continued until the crisis as well.

Also in India, NFCs decreased their rate of reinvestment while increasing the accumulation of financial assets. However, both measures of financialisation remained flat. The low level of financial payments is due to decreasing interest paid from 2001, and to decreasing dividends distributed from 2004 (See Figure A3 in the Appendix).

In China, the rate of reinvestment of NFCs decreased substantially only after 2005, whilst the increase in the accumulation of financial assets started in 2006. Chinese NFCs had an increasing rate of accumulation, starting from the lowest level in 1998 (0.13 per cent) to the peak in 2011 (0.34 per cent). Financial payments remained stable at low levels for most of the period, and started to increase after 2009. NFCs' non-operating financial income decreased in the first part of the 2000s and started increasing in 2006, in parallel to the accumulation of financial assets.

In conclusion, the stylized facts for the various groups of NFCs considered show a) a stagnant rate of accumulation b) a declining rate of reinvestment of operating income c) an increase in the overall degree of financialisation in terms of financial assets, financial income as well as financial payments both in the different country groups and in the single countries in both the developed and developing world. These stylized facts suggest a negative relationship between the rate of accumulation and the financial activities of NFCs, which will be investigated further via econometric estimations in the next section.

5. Estimation methodology

The two specifications presented in section 3 are estimated using a dynamic panel-data model including one lag of the accumulation rate as explanatory variables. As explained in section 3, investment is an intrinsically dynamic phenomenon.

In dynamic panel data models, the unobserved panel-level effects are correlated with the lagged dependent variables. Therefore, standard estimators (e.g. Ordinary or Generalized Least Squares) would be inconsistent. Therefore, we estimate our models using a difference-GMM estimator (Arellano and Bond, 1991). This methodology is suitable for analyses based on a 'small time/large observations' sample.⁶ GMM is a powerful estimator for analyses based on firm-level data mainly for three reasons (Roodman, 2009). First, GMM is one of the best techniques to control for all sources of endogeneity between the dependent and explanatory variables, by using internal instruments, namely the lagged levels of the explanatory variables, which allows us to address dual causality, if rising financial payments and incomes is also a consequence of the slowdown in the capital accumulation. The instrument set consists of instruments that are not correlated with the first difference of the error term, but correlated with the variable we are estimating. Second, by first-differencing variables, this estimator eliminates companies' unobservable fixed effects. Third, GMM can efficiently address autocorrelation problems. We apply two tests to assess the appropriateness of the instrument sets, and lag structures. First, we check for second-order serial correlation with the Arellano-Bond test (Arellano and Bond, 1991). Second, we verify the validity of the instruments sets

⁶ The full period is 29 years, but the average period for which all the variables are available is 6-9 years.

through the Hansen test.⁷ In all models, the lagged dependent variable enters the instrument set as endogenous while all other explanatory variables enter as predetermined regressors. Consistently, the instrument sets include the second and third lags of the lagged dependent variable, and the first and second lags of the other lagged explanatory variables. We test the joint significance of the time dummies, and the consistency of the interaction dummies on financial income using a Wald test.

All the variables are in logarithmic form to allow for non-linear relationships between the dependent and the explanatory variables. Furthermore, the logarithmic scale enables us to reduce the disturbances coming from the presence of heteroskedasticity. Robust standard errors are calculated through a two-step procedure after a finite-sample correction (Windmeijer, 2005).

All the estimations for the country groups come from weighted regressions, with the weights equal to 1 divided by the number of available observations in that country. This procedure mitigates the bias in the results coming from the highest data availability for several countries.

Finally, we apply a general-to-specific estimation procedure, to arrive at a specification with only significant variables.

6. Estimation results

The first part of this section presents our estimation results based on Equations (1) and (2) discussed in section 3. In the second part we provide the economic effects of our estimates. Table 2 presents the results for groups of countries as well as country-specific estimations for selected countries based on equation (1). As expected, the lagged level of accumulation, sales, and operating profit have a general positive effects on investment. However, the statistical significance of profitability is borderline in Europe. Moreover, with this specification we found highly insignificant effect of profitability in Japan, South Korea, South Africa, India, and China. Aggregated financial payments (dividends and interest) have a significant and negative effect on the rate of accumulation in both the developed and developing world in all country groups as well as estimations for selected individual countries other than India and China. The negative effect is particularly high in the aggregate group of Developing countries, BRICS, and South Africa. In China and India the effects of total financial payments are statistically insignificant.

⁷ Hansen test takes the orthogonality between instruments and regressions' residuals as the indicator of consistency between estimated and sample moments. We tested and confirmed the presence of heteroskedasticity in our sample by using the White/Koenker and the Breusch-Pagan/Godfrey/Cook-Weisberg tests. Hansen's-J test is preferred to the Sargan test in the presence of heteroskedasticity (Roodman, 2009). However, the Hansen test (as the Sargan test) is sensitive to the total number of instruments. Therefore, we use only the first and second lags of our variables as instruments. Furthermore, all instruments are 'collapsed', thus having an instrument for each variable and lag distance.

According to the results in Table 2, the impact of non-operating financial income (π_F/K) on investment is mixed. We find a significant negative effect of financial income on investment only in Europe (-0.06), BRICS (-0.05), and India (-0.14). The effect of financial income in China is positive and highly significant (0.13). For the other countries and for the developing and emerging group as a whole the aggregate effect of total financial income is statistically insignificant.

However, as already discussed in section 3, theoretically the sign of the effect of non-operating income on physical accumulation is ambiguous. On the one hand, relatively smaller companies may use this additional source of income to partially ease liquidity constraints. On the other hand, the larger and more flexible non-financial companies may see short-term and reversible financial investment as an attractive alternative to physical investment. This choice may then come at the expense of long-term physical investment, and thus has an adverse on the rate of accumulation of these large corporations. In other words, the heterogeneity that naturally characterizes firms can play an important role in the analysis of the effects of financial income on investment (Tori and Onaran, 2015; 2017). We explored this possible dual, non-linear effect, by including an interaction dummy variable to account for the potentially different effect of financial income with respect to the size of the company (measured in terms of total assets). In these alternative specifications, as described in Equation (2) in section 2, the coefficient associated with the variable π_F/K show the effect of companies in the different top percentiles of the distribution. To compute the elasticity for the remaining companies we add the coefficient for $(\pi_F/K)*D_n$ and the coefficient for π_F/K . There is indeed evidence that the impact of financial income differ with respect to the size of the company; however, the size, which is the percentile of the companies in terms of the distribution of total assets for which we capture these opposite effects is not the same for every country/group. The results are reported in Table 3 for the countries/groups where we were able to find a statistically significant difference between the large and small companies with respect to the impact of financial incomes.

In the US, in the top 40 per cent companies in terms of total assets financial incomes has a strongly negative effect on investment; we also find the similar opposite effects also with interaction dummies at 80 per cent, 70 per cent, and 60 per cent levels of disaggregation. Thus in the largest 40 per cent of the companies the impact is negative, while rate of accumulation of the remaining 60 per cent partially benefit from non-operating activities.

For the NFCs in Japan in the top 20 per cent of the distribution in terms of total assets the effect of financial incomes on accumulation is again strongly negative, while the effect for the lowest 80 per cent is positive, with a coefficient equal to 0.24.

For the companies in the Developing and Emerging group, the effect for the companies in the top 60 per cent of the distribution is negative but insignificant. The introduction of the size effects

result in a significant negative impact of financial incomes on the lowest 40 per cent. For this group we find that, overall, even the smaller companies are characterized by a negative elasticity of financial incomes on accumulation.

Larger South Korean companies (top 10 per cent) experience the strongest negative effects (crowding-out effect) of non-operating income on real investment with the highest estimated coefficient (-1.26). The remaining 90 per cent of the sample experience a significant and positive impact (0.11). South Korean companies show similar different behaviours also when comparing top and bottom 50 per cent of the total assets distribution. In South Africa, total financial incomes have a positive effect for the small companies that lie on the bottom 70 per cent of the distribution of total assets (0.08). On the contrary, the largest companies in the top 30 per cent of the distribution experienced a negative impact of non-operating incomes on their rate of accumulation (-0.43).

The negative impacts of total financial payments on investment are robust to the inclusion of the size dummies in all these specifications, apart from Japan. In addition, in this specification, the coefficient of operating profit in the case of Japan has improved, and is now significant and positive (the significance of this variable is improving also in the case of S. Korea, although is still borderline insignificant). Hence, overall the results in Table 3 reflects a better specification for some countries.

Finally, we do not find significant and robust evidence of any non-linearity in the effect of financial income on the investment of the NFCs in Europe, BRICS, India, and China. Hence, in Europe, BRICS as a whole, and India financial income has a negative effect on investment in the small as well as large NFCs.

The elasticities discussed above provide a partial picture about the various effects of financialisation on investment. Table 4 presents the long-run coefficients, the actual cumulative changes, and the economic effects based on the estimations in Table 2 for the countries that do not show evidence of non-linearity in the impact of financial income (i.e. Europe, BRICS, India, and China). We first compute the long-run elasticities by dividing each short-run elasticity by one minus the coefficient of the lagged dependent variable. Multiplying the long-run elasticity by the actual cumulative change in each variable for the estimation period, we get the corresponding economic effect. We compute the economic effects for the period of 1995-2007, thus excluding the impact of the financial crisis, after which financial activities have been overall severely affected.

Looking at the two control variables, in general sales had a stronger positive effect on investment compared to the profit rate. With respect to financial payments, BRICS experience the strongest negative economic effect on investment: investment has been 5.3 per cent lower due to the rise in financial payments during 1995-2007. This effect is null in the case of India and China where the estimated coefficient was statistically insignificant. With respect to financial incomes, the

evidence is mixed. The economic effect of financial incomes has been negative in both BRICS and Europe (-5.3 and -4.6 per cent respectively), whilst it has been positive in India and China (21.9 and 4 per cent respectively). It has to be noted that, for China the positive effect is resulting from both positive long-run coefficient and actual cumulative change, while in the case of India this is due to a strong reduction in financial incomes during the period considered despite a negative coefficient.

Table 5 presents the long-run coefficients, the actual changes, and the economic effects based on the estimated elasticities in Table 3. Also for this group of estimations, the economic impact of sales on investment is by far larger than the one of profit (on average 21 vs. 2 per cent). With respect to aggregate financial payments, the large firms in the group of Developing and Emerging countries experience the strongest negative effect, where investment declines by 12.9 per cent due to the rise in financial payments, followed by S. Africa (-2.8 per cent), and USA (-2 per cent). In Japan, the economic effect is null due to an insignificant long-run coefficient, whilst in S. Korea this effect has been positive due to a negative actual cumulative change. These results provide a strong evidence of the negative impact of interest and dividends payments on accumulation across the world, except for Japan, India, and China.

The evidence about economic effects of financial incomes is, as expected, mixed. In general, the economic effect is negative for larger companies. Although the effects are not fully comparable due to the different size thresholds, larger companies in S. Korea experience the strongest negative impact on the rate of accumulation due to rising financial incomes (-64.8 per cent). Larger companies in the USA experience a negative impact of -6.2 per cent. In Japan, due to the combination of a small fall in financial incomes and a strongly negative long-run coefficient, the economic effect turns slightly positive (0.5 per cent). On the contrary, the economic effect of financial incomes is positive for relatively smaller companies. Smaller companies in S. Korea are the ones for which investment benefited most from financial incomes (7.5 per cent), followed by the ones in Japan (6.7 per cent), S. Africa (2.4 per cent), and the USA (0.8 per cent). In the group of NFCs in developing and emerging countries, the effect is negative (-1.8 per cent) for the smaller companies (the ones in the lowest 40 per cent of the distribution) due to a negative long-run coefficient.

8. Conclusion

In this article we present empirical evidence on the effects of financialisation on firm-level investment in the publicly listed NFCs in both the developed and developing world. We show that financialisation, depicted as the increasing orientation towards external financing, and the internal substitution of fixed capital accumulation by financial activity, has a fundamental role in suppressing investment in the NFCs. The lower availability of internal funds constrains the investment decision.

On the one hand, the increase in financial payments for external finance and to favor the shareholders (interest and dividends) reduce the NFCs internal funds, and thus physical capital accumulation. On the other hand, the negative crowding-out effects of financial investment on accumulation more than offset the gains from relaxing the cash-flow constraint. Financial incomes have a positive effect on investment only for the smaller companies in some country groups, but a significant negative effect in the large companies in both the developed and developing world. Larger companies create the vast majority of capital, and the crowding out of physical investment of these companies by financial activity is a substantial drag on the investment performance and productivity of these countries.

The only exceptions to significant negative effects of financial income on investment (both at the aggregate level and when controlling for companies' size) is China, where we find a positive effect of financial income. In addition, although in India the estimated elasticity for financial income is negative, a negative actual change in the variable results in a positive economic effect. Furthermore, both in China and India financial payments do not have a significant impact on investment. These findings highlight the importance of further research in understanding the role of the State and industrial policy in shaping investment, and the link between finance and investment in these countries.

These results provide support to the theoretical arguments regarding the overwhelming negative effects of financialisation and confirm previous empirical findings at the macro and microeconomic levels in the literature, albeit some diversity. The increasing interrelations between the financial markets and the NFCs are progressively reducing fixed capital accumulation, and thus growth. These results contrast with the conventional arguments regarding the beneficial effects of financial liberalization and financial deepening.

To reach a stable and vigorous dynamic of investment, a de-financialisation of the non-financial sector is desirable. This requires an extended regulation of companies' non-operating financial activities along with financial regulation.

The investigations of the determinants of companies' 'financial accumulation', the sources of businesses' financial assets, as well as the impact of different institutional settings are important questions for future research.

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Figures and Tables

Figure 1.a Investment/operating income (I/π), developed countries

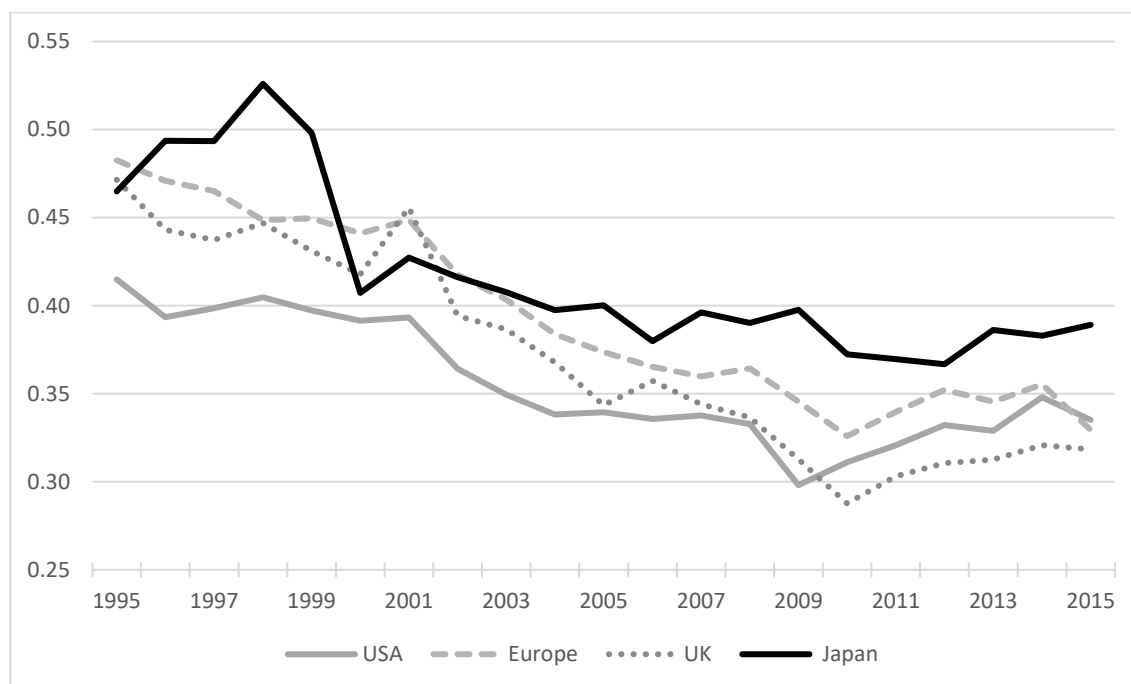
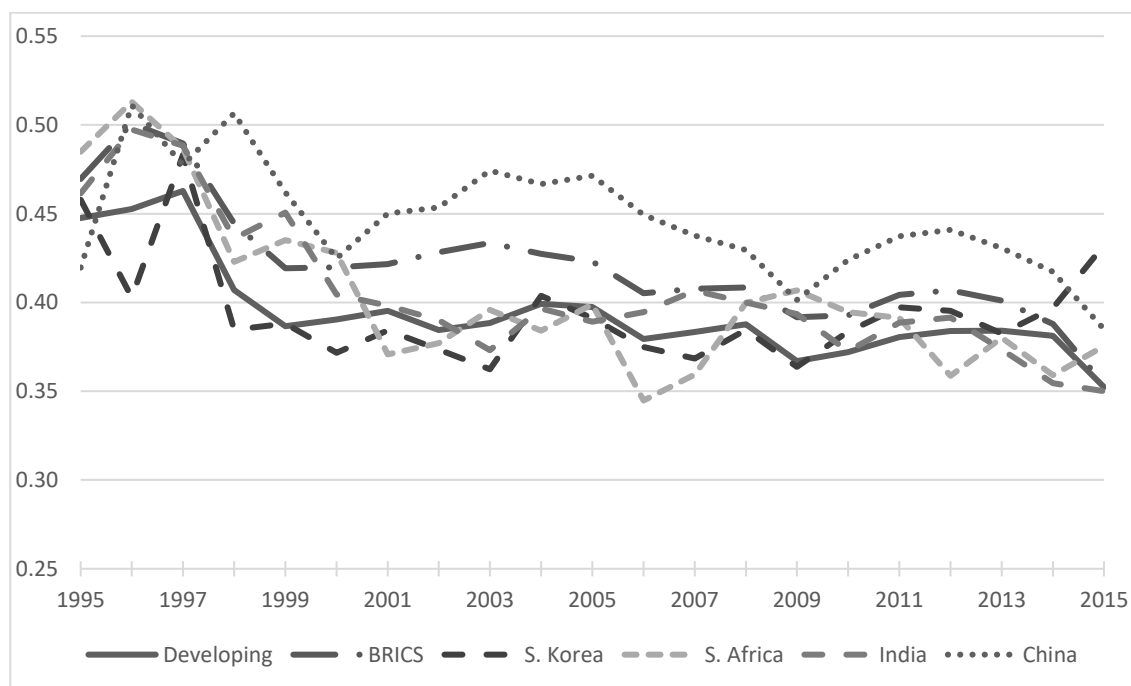


Figure 1.b Investment/operating income (I/π), developing and emerging countries



Source: authors' calculation based on Worldscope data.

Figure 2.1a Investment/operating income (I/π), financial assets/total assets (FA/K), the USA

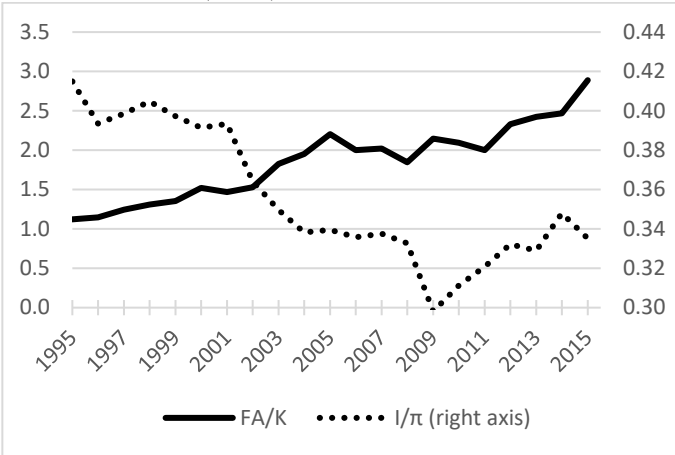


Figure 2.1b Rate of accumulation (I/K), financial payments/total assets (F/K), and financial incomes/ total assets (π_F/K), the USA

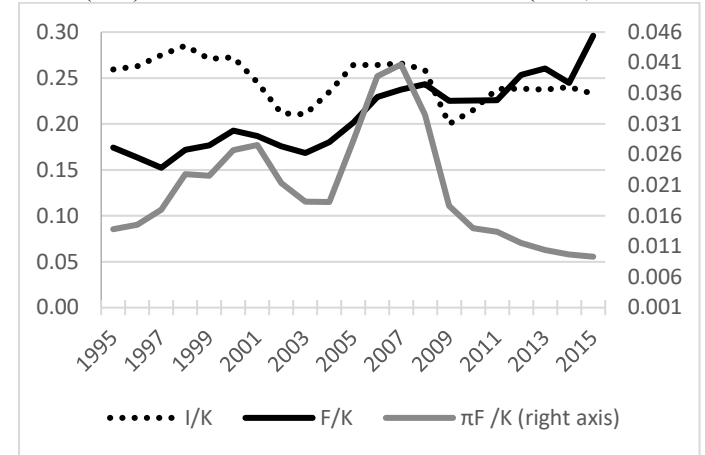


Figure 2.2a Investment/operating income (I/π), financial assets/total assets (FA/K), Europe

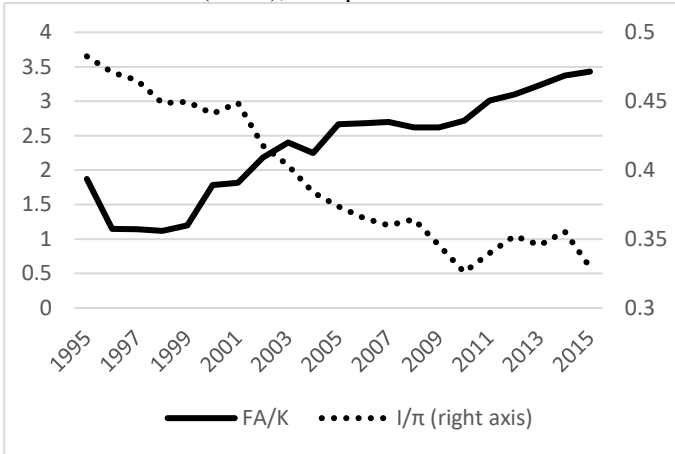


Figure 2.2b Rate of accumulation (I/K), financial payments/total assets (F/K), and financial incomes/ total assets (π_F/K), Europe

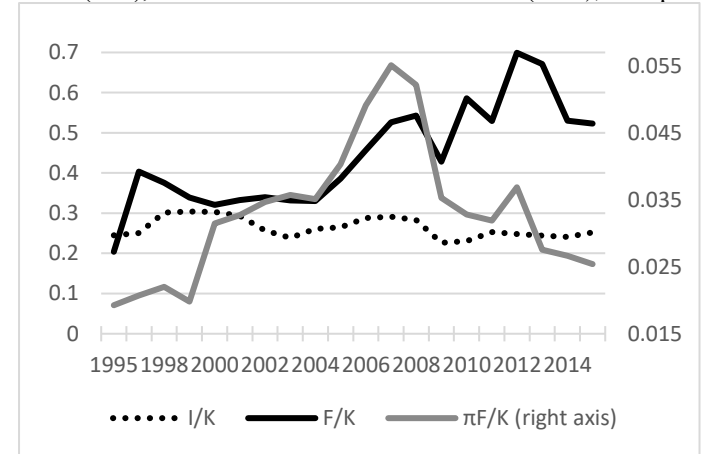


Figure 2.3a Investment/operating income (I/π), financial assets/total assets (FA/K), Japan

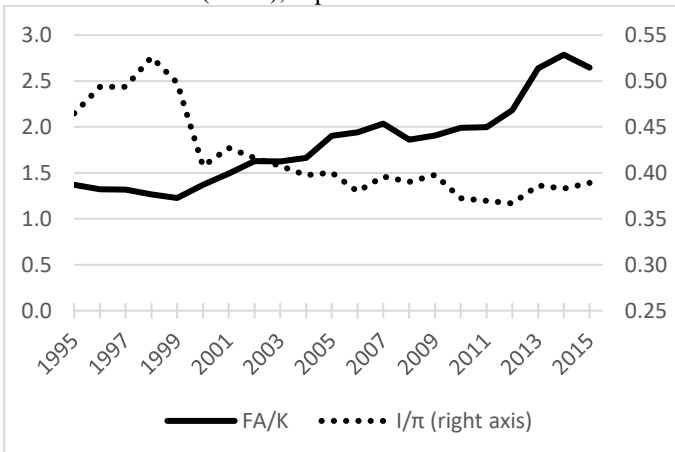
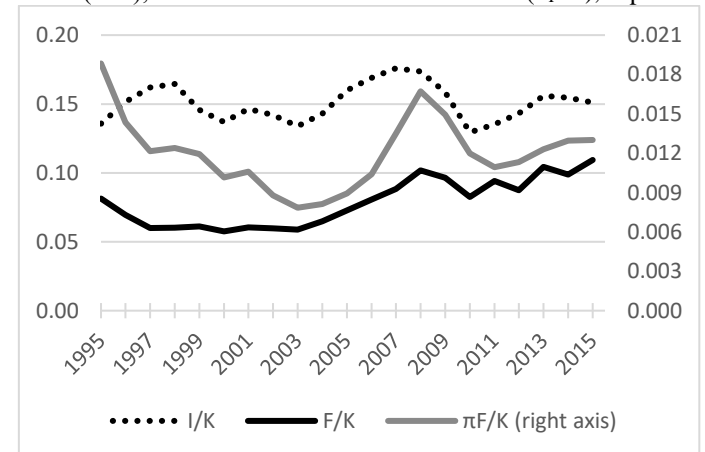


Figure 2.3b Rate of accumulation (I/K), financial payments/total assets (F/K), and financial incomes/ total assets (π_F/K), Japan



Source: authors' calculation based on Worldscope data.

Figure 2.4a Investment/operating income (I/π), financial assets/total assets (FA/K), Developing Countries

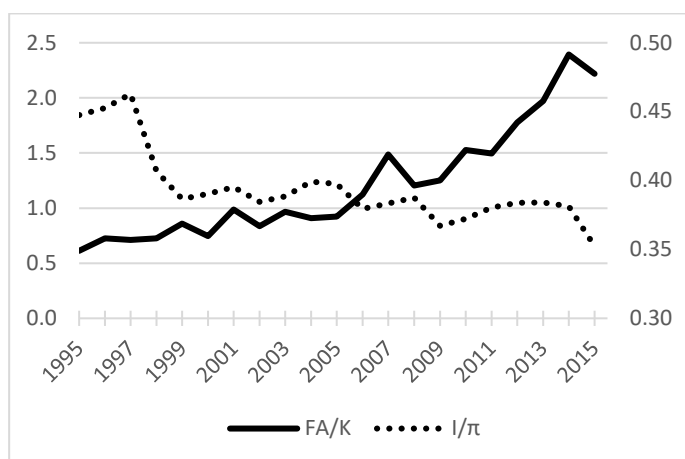


Figure 2.4b Rate of accumulation (I/K), financial payments/total assets (F/K), and financial incomes/ total assets (π_F/K), Developing Countries

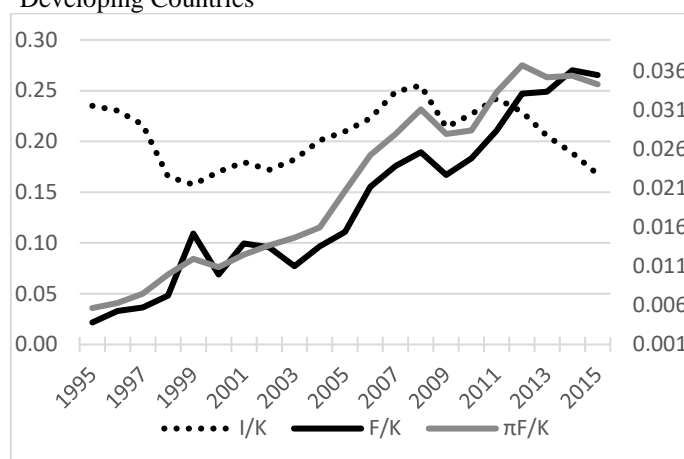


Figure 2.5a Investment/operating income (I/π), financial assets/total assets (FA/K), BRICS

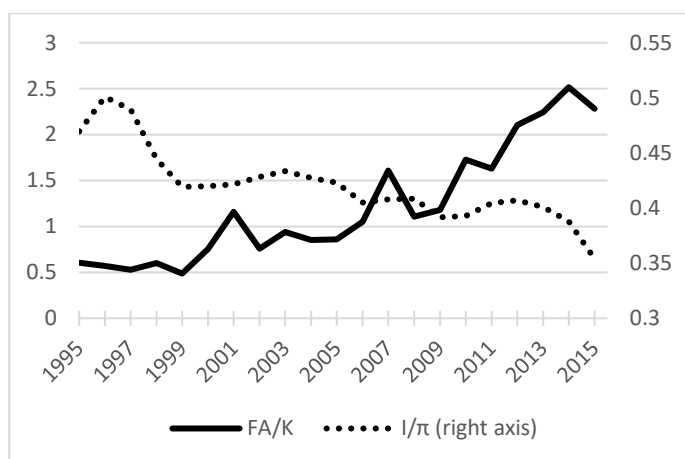


Figure 2.5b Rate of accumulation (I/K), financial payments/total assets (F/K), and financial incomes/ total assets (π_F/K), BRICS

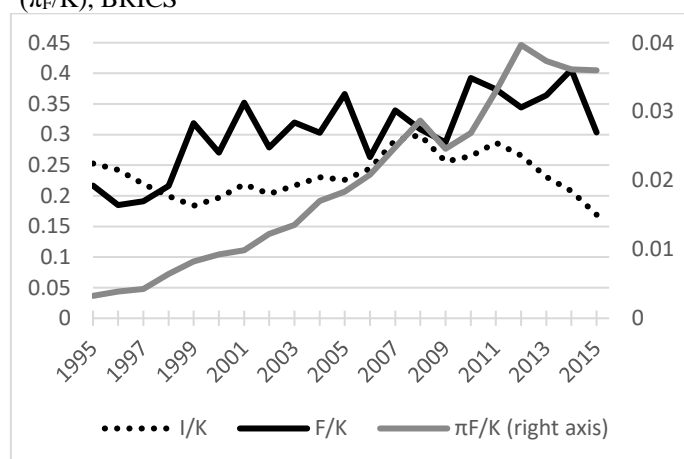


Figure 2.6a Investment/operating income (I/π), financial assets/total assets (FA/K), S. Korea

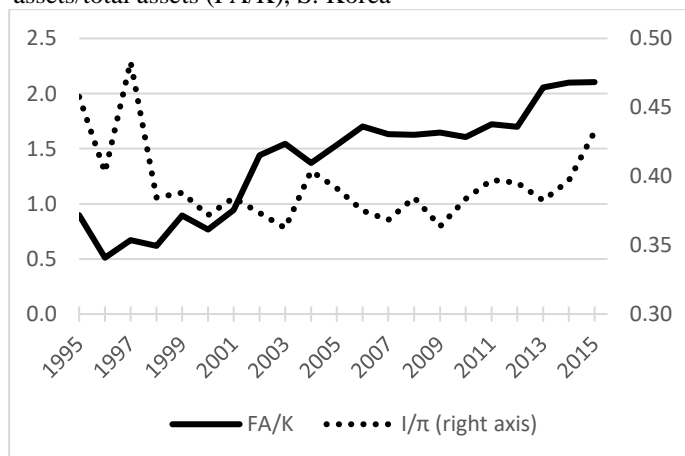
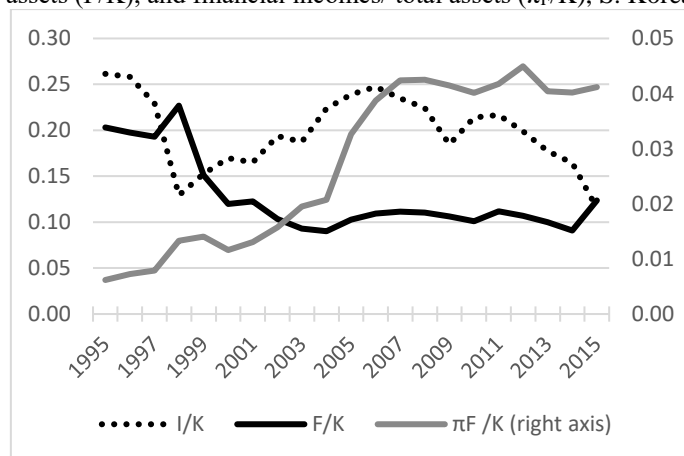


Figure 2.6b Rate of accumulation (I/K), financial payments/total assets (F/K), and financial incomes/ total assets (π_F/K), S. Korea



Source: authors' calculation based on Worldscope data.

Figure 2.7a Investment/operating income (I/π), financial assets/total assets (FA/K), S. Africa

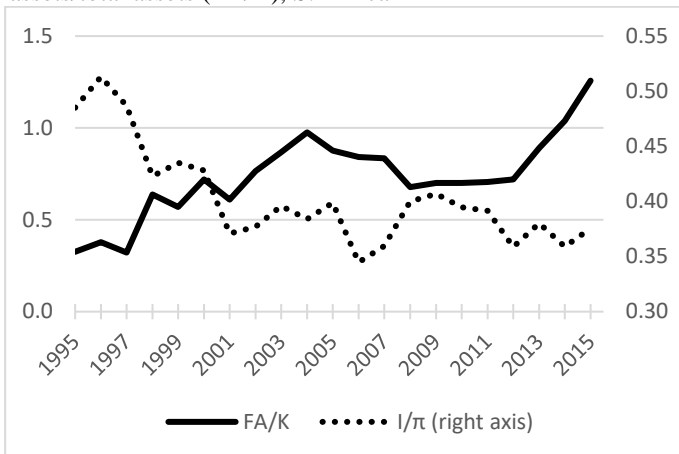


Figure 2.7b Rate of accumulation (I/K), financial payments/total assets (F/K), and financial incomes/ total assets (π_F/K), S. Africa

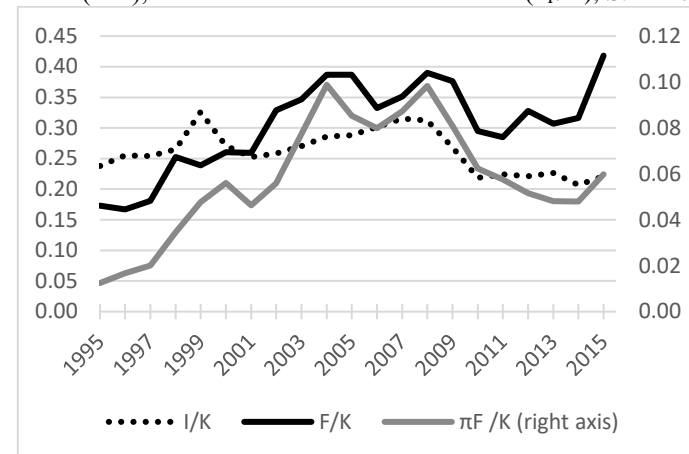


Figure 2.8a Investment/operating income (I/π), financial assets/total assets (FA/K), India

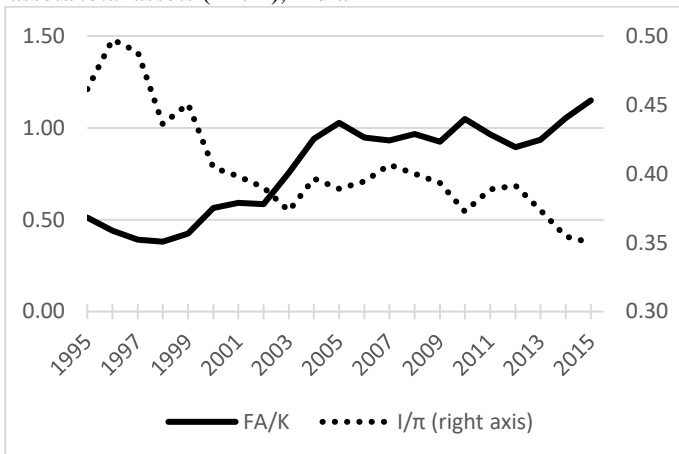


Figure 2.8b Rate of accumulation (I/K), financial payments/total assets (F/K), and financial incomes/ total assets (π_F/K), India

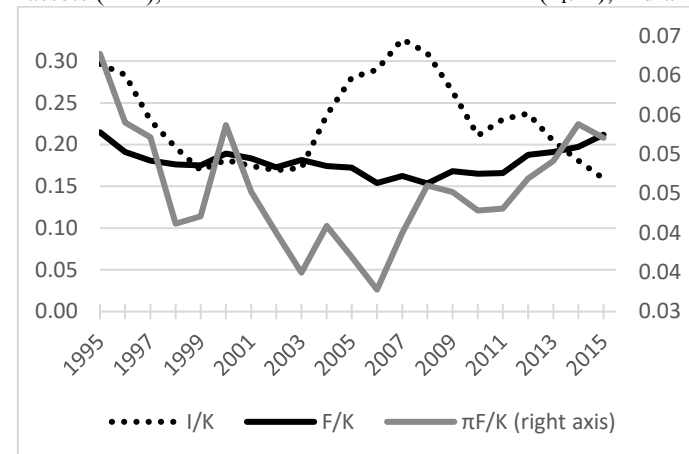


Figure 2.9a Investment/operating income (I/π), financial assets/total assets (FA/K), China

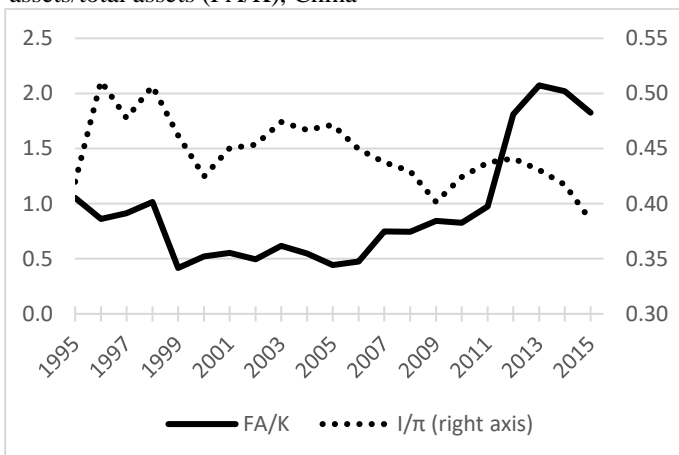
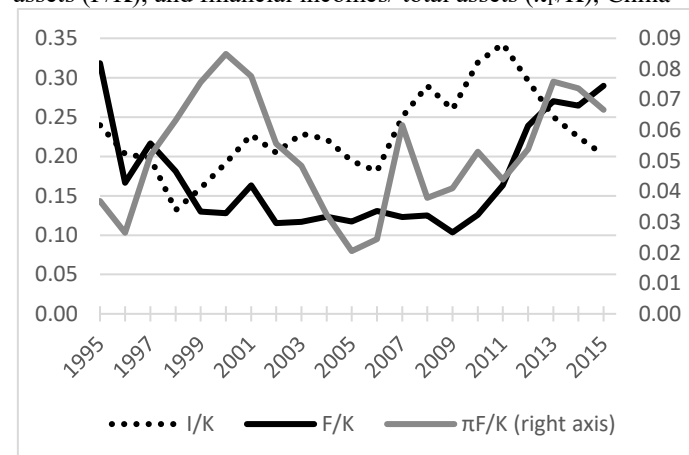


Figure 2.9b Rate of accumulation (I/K), financial payments/total assets (F/K), and financial incomes/ total assets (π_F/K), China



Source: authors' calculation based on Worldscope data.

Table 1. Composition of the country groups.

<i>Europe</i>	<i>BRICS</i>	<i>Developing and Emerging</i>		
Austria Belgium Denmark Finland France Germany Greece Ireland Italy Luxembourg Norway The Netherlands Portugal Spain Sweden Switzerland United Kingdom	Brazil Russia India China S. Africa	Argentina Bangladesh Brazil Chile China Colombia Egypt India Indonesia Malaysia Mexico Morocco Nigeria Pakistan Philippines Peru Russia Singapore S. Africa South Korea Sri Lanka Thailand Turkey Venezuela Vietnam	USA	Japan

Table 2. Estimation results based on Equation (1), dependent variable rate of accumulation, $(I/K)_t$

	<i>USA</i>	<i>Europe</i>	<i>BRICS</i>	<i>Japan</i>	<i>Developing and Emerging</i>	<i>S. Korea</i>	<i>S. Africa</i>	<i>India</i>	<i>China</i>
$\left(\frac{I}{K}\right)_{t-1}$	0.327*** (0.000)	0.398*** (0.000)	0.320*** (0.000)	0.219*** (0.000)	0.355*** (0.000)	0.287*** (0.000)	0.308*** (0.000)	0.486*** (0.000)	0.154* (0.092)
$\left(\frac{S}{K}\right)_{t-1}$	0.397*** (0.000)	0.317** (0.002)	0.359*** (0.000)	1.111*** (0.000)	0.349*** (0.000)	0.720*** (0.000)	0.220*** (0.021)	0.367* (0.098)	0.422** (0.028)
$\left(\frac{\pi}{K}\right)_{t-1}$	0.050*** (0.000)	0.022 (0.112)	0.044*** (0.017)	0.011 (0.640)	0.043*** (0.001)	0.004 (0.880)	0.040 (0.316)	0.054 (0.236)	0.055 (0.374)
$\left(\frac{F}{K}\right)_{t-1}$	-0.072*** (0.000)	-0.059*** (0.008)	-0.137*** (0.001)	-0.276** (0.024)	-0.097*** (0.000)	-0.078** (0.013)	-0.119*** (0.001)	-0.065 (0.623)	-0.110 (0.192)
$\left(\frac{\pi_F}{K}\right)_{t-1}$	0.034 (0.171)	-0.061** (0.027)	-0.045* (0.097)	-0.074 (0.350)	0.017 (0.584)	0.021 (0.651)	-0.030 (0.480)	-0.136** (0.033)	0.134*** (0.009)
<i>Number of observations</i>	11948	22240	15164	16467	31983	6665	2057	8670	2781
<i>Number of firms</i>	1659	2846	3394	1941	6463	1245	230	1470	1414
<i>Number of Instruments</i>	29	29	29	29	29	29	29	29	29
<i>p-value A-B test (AR2)</i>	0.772	0.512	0.122	0.140	0.560	0.249	0.124	0.287	0.509
<i>p-value Hansen test</i>	0.630	0.232	0.417	0.122	0.349	0.169	0.112	0.380	0.682
<i>Time effects</i>	yes	yes	yes	yes	yes	yes	yes	yes	yes
<i>p-value Wald test for time effects</i>	0.000	0.001	0.000	0.000	0.000	0.002	0.000	0.000	0.000

All estimations based on Equation (1) period 1995-2015. Two-step difference-GMM estimations with robust standard errors. Coefficients for the year dummies are not reported. *p-values* in parenthesis. *significant at 10 per cent; **significant at 5 per cent; ***significant at 1 per cent.

Table 3. Estimation results based on Equation (2), dependent variable rate of accumulation, $(I/K)_t$

	<i>USA</i>	<i>Japan</i>	<i>Developing and Emerging</i>	<i>S. Korea</i>	<i>S. Africa</i>
$\left(\frac{I}{K}\right)_{t-1}$	0.348*** (0.000)	0.206*** (0.000)	0.360*** (0.000)	0.292*** (0.000)	0.324*** (0.000)
$\left(\frac{S}{K}\right)_{t-1}$	0.377*** (0.000)	0.809** (0.000)	0.354*** (0.000)	0.705*** (0.000)	0.240** (0.015)
$\left(\frac{\pi}{K}\right)_{t-1}$	0.045*** (0.000)	0.045*** (0.000)	0.042*** (0.001)	0.024 (0.117)	0.034 (0.413)
$\left(\frac{F}{K}\right)_{t-1}$	-0.051** (0.015)	-0.128 (0.235)	-0.091*** (0.000)	-0.076** (0.017)	-0.098*** (0.010)
$\left(\frac{\pi_F}{K}\right)_{t-1}$	-0.255*** (0.000)	-0.899* (0.064)	-0.023 (0.439)	-1.262** (0.022)	-0.426* (0.077)
$\left[\left(\frac{\pi_F}{K}\right)_{t-1} * D_{90}\right]_{t-1}$				1.375** (0.012)	
$\left[\left(\frac{\pi_F}{K}\right)_{t-1} * D_{80}\right]_{t-1}$		1.138** (0.031)			
$\left[\left(\frac{\pi_F}{K}\right)_{t-1} * D_{70}\right]_{t-1}$					0.501* (0.099)
$\left[\left(\frac{\pi_F}{K}\right)_{t-1} * D_{60}\right]_{t-1}$	0.425*** (0.001)				
$\left[\left(\frac{\pi_F}{K}\right)_{t-1} * D_{50}\right]_{t-1}$					
$\left[\left(\frac{\pi_F}{K}\right)_{t-1} * D_{40}\right]_{t-1}$			-0.141*** (0.001)		
<i>Number of observations</i>	11948	7652	31983	6665	2057
<i>Number of firms</i>	1659	1596	6463	1245	230
<i>Number of Instruments</i>	31	31	31	31	31
<i>p-value A-B test (AR2)</i>	0.897	0.269	0.611	0.168	0.159
<i>p-value Hansen test</i>	0.496	0.424	0.385	0.211	0.171
<i>Time effects</i>	yes	yes	yes	yes	yes
<i>p-value Wald test for time effects</i>	0.000	0.000	0.000	0.001	0.000
<i>p-value Wald test for $\beta_5+\beta_6=0$</i>	0.002	0.012	0.002	0.001	0.038

All estimations based on Equation (2) period 1995-2015. Two-step difference-GMM estimations with robust standard errors. Coefficients for the year dummies are not reported. *p-values* in parenthesis. *significant at 10 per cent; **significant at 5 per cent; ***significant at 1 per cent.

Table 4. Economic effects, 1995-2007

	S/K			π/K			F/K			π_F/K		
<i>Country/group</i>	Long-run coefficient	Actual cumulative change	Economic Effect	Long-run coefficient	Actual cumulative change	Economic Effect	Long-run coefficient	Actual cumulative change	Economic Effect	Long-run coefficient	Actual cumulative change	Economic Effect
Europe	0.527	0.405	0.213	0.000	0.667	0.000	-0.098	0.400	-0.039	-0.101	0.457	-0.046
BRICS	0.528	0.391	0.207	0.065	0.066	0.004	-0.201	0.196	-0.053	-0.066	0.804	-0.053
India	0.714	0.317	0.226	0.000	0.125	0.000	0.000	-0.512	0.000	-0.265	-0.828	0.219
China	0.499	0.624	0.311	0.000	0.072	0.000	0.000	-0.880	0.000	0.158	0.251	0.040

Table 5. Economic effects, disaggregation by size of firm, 1995-2007

	S/K			π/K			F/K			π_F/K (big)			π_F/K (small)		
<i>Country/group</i>	Long-run coefficient	Actual cumulative change	Economic Effect	Long-run coefficient	Actual cumulative change	Economic Effect	Long-run coefficient	Actual cumulative change	Economic Effect	Long-run coefficient	Actual cumulative change	Economic Effect	Long-run coefficient	Actual cumulative change	Economic Effect
USA	0.578	0.199	0.115	0.069	0.180	0.012	-0.078	0.284	-0.022	-0.391	0.067	-0.026	0.261	0.030	0.008
Japan	1.019	0.322	0.328	0.057	0.402	0.023	0.000	0.133	0.000	-1.132	-0.004	0.005	0.301	0.221	0.067
Developing and Emerging	0.553	0.474	0.262	0.066	0.427	0.028	-0.142	0.909	-0.129	0.000	0.185	0.000	-0.064	0.285	-0.018
S.Korea	0.996	0.337	0.335	0.000	0.111	0.000	-0.107	-0.262	0.028	-1.782	0.364	-0.648	0.160	0.468	0.075
S.Africa	0.355	0.424	0.151	0.000	0.376	0.000	-0.145	0.308	-0.045	-0.630	0.201	-0.127	0.111	0.213	0.024

Appendices

Table 1A. Variable definitions and codes

<i>Symbol</i>	<i>Variable</i>	<i>Definition</i>	<i>Worldscope Code</i>
<i>I</i>	Investment	Addition to fixed assets	WC04601
<i>K</i>	Capital stock	Net fixed capital stock	WC02501
<i>S</i>	Sales	Net sales	WC01001
π	Profit rate	Operating income	WC01250
<i>F</i>	Financial Payments	Interest + cash dividends paid	WC01251 + WC04551
π_F	Non-operating profit	Non-operating profit from interest and dividends	WC01266 + WC01268
<i>FA</i>	Financial assets	Cash, other investment, short-term investment, other current assets	WC02003 + WC02250 + WC02008 + WC02149